ENTRY NO. 17

NAME OF MACHINE S.A.R.A. Injector

INSTITUTION INSTITUT DES SCIENCES NUCLEAIRES

ADDRESS 53, avenue des Martyrs 38026 GRENOBLE CEDEX - FRANCE

TEL (76) 47-66-36 TELEX 320301F

IN CHARGE P. MARTIN/M. LIEUVIN REPORTED BY M. LIEUVIN

HISTORY AND STATUS

DESIGN, date 1962 Model tests 1963

ENG DESIGN, date 1963 - 1965

CONSTRUCTION, date 1963 - 1967

FIRST BEAM, date (or goal) July 1968

MAJOR ALTERATIONS

COST, ACCELERATOR $ 2.10^6

COST, FACILITY, total $ 6.10^6

FUNDED BY I.N2.P3./C.N.R.S.

ACCELERATOR STAFF, OPERATION AND DEVELOPMENT

SCIENTISTS 1 ENGINEERS 10

TECHNICIANS 30 CRAFTS 1

GRAD STUDENTS involved during year

OPERATED BY Research staff or Operators

OPERATION 144 hr/wk. On target 130 hr./wk

TIME DISTR. in house 50 % Outside 50 %

BUDGET, op & dev $ 6.10^5 (whole S.A.R.A.)

FUNDED BY I.N2.P3./C.N.R.S.

RESEARCH STAFF, not included above

USERS, in house 40 outside 40

GRAD STUDENTS involved during year 4

RESEARCH BUDGET, in house

FUNDED BY I.N2.P3/C.N.R.S.

MAGNET

POLE FACE, diameter (compact) 212 cm, R extraction cm

R injection cm

GAP, min 16 cm, Field 19 kG
min 36 cm, Field 12 kG } at 360.10^3 Ampere turns

AVERAGE FIELD at R ext 16 kG

B max/ < B > 1.2

NUMBER OF SECTORS { compact 4 / separated } Spiral, max 40 deg

SECTOR ANGLE (SSC) deg

TRIMMING COILS 11 circular
4 harmonic

CONDUCTOR, material and type Copper 18 x 13 mm bore Ø 10

STORED ENERGY (cryogenic) MJ

POWER: main coils 270 max, kW; current stability 1.10^-5
trimming coils 10 max, kW; current stability 1.10^-5

WEIGHT: Fe 200 tons; coils 8 tons

COOLING system Water

ION ENERGY (bending limit) E/A = 90 q²/a² MEV/amu
(focusing limit) E/A = q/a MeV/amu

ACCELERATION SYSTEM

DEES, number 2 Angle 80 deg

BEAM APERTURE 4 cm; DC Bias kV

TUNED by, coarse M.P. fine

RF 10.7 to 21 mHz, stable ± 10^-6

Orb F 3.6 to 21 mHz

HARMONICS, RF/Orb F, used 1, 2, 3

DEE—Gnd, max 60 kV, min gap cm

STABILITY, (pk-pk noise)/(pk RF volt) 10^-4

ENERGY GAIN, max 240 kV/turn

RF PHASE, stable to ± 10 deg

RF POWEP input, max 2 x 20 kW

FREQUENCY MODULATION, rate /s

modulator, type

beam pulse, width

VACUUM SYSTEM

OPERATING PRESSURE 10^-6 Torr or mbar

PUMPS, No, Type, Size 2 XNRC oil diffusion

ION SOURCES

ECR external, polarized external, PIG internal.

INJECTION SYSTEM

Electrostatic inflector for axial injection

EXTRACTION SYSTEM

Electrostatic deflector + magnetic channel

FACILITIES FOR RESEARCH

SHIELDED AREA, fixed 300 m²; movable 500 m²

TARGET STATIONS 7 in 5

STATIONS served at same time, max 1

MAG SPECTROGRAPH, type Narrow range 0.9 GeV/C

COMPUTER model PDP11/34 on line +

OTHER FACILITIES PDP11/34 off line

CHARACTERISTIC BEAMS

PARTICLE	ENERGY (MeV) Goal	Achieved	CURRENT (pμA) Internal	External
$^{12}p_3$+		60	20	10
$^{12}C^{3+}$	63	63	5	2
SECONDARY		(part/s)		

BEAM PROPERTIES

	MEASURED		CONDITIONS		
PULSE WIDTH	5	RF deg	5 pμ A of	63 MeV	C^{3+} ions
PHASE EXC. max		RF deg	pμ A of	MeV	ions
EXTRACT eff	60	%	5 pμ A of	63 MeV	C^{3+} ions
RESOL ΔE/E	0.4	%	pμ A of	MeV	ions
EMITTANCE (π mm. mrad)	15 axial / 17 rad		5 pμ A of	63 MeV	C^{3+}

OPERATING PROGRAMS, time distribution

BASIC NUCLEAR PHYSICS 95 % SOLID STATES PHYSICS

BIOMEDICAL APPLICAT 5 % ISOTOPE PRODUCTIONS

REFERENCES/NOTES

Annales de Radioélectricité T. XXI n° April 1966 p 122 - 150.

PLAN VIEW OF FACILITY, COMMENTS, ETC.

Injector of the two cyclotrons system S.A.R.A.

described elsewhere.